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TRANSLATIONS ON TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

No. 54

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BRIEFS

PORTUGAL-CAPE VERDE COOPERATION--The Portuguese delegation from the Postal Service and Telecommunications which arrived in Cape Verde on 21 June 1978 and was scheduled to leave 24 June 1978, was to study with appropriate officials the ways to develop cooperation in this area. The Portuguese delegation, headed by the Inspector General of the Postal Service Joao Cunha e Serra, discussed scholarships for training and retraining, the exchange of scientific and technical documentation and the study of methods of technical assistance to the telecommunications complex. Recently, in the framework of the technical cooperation agreement signed between Portugal and Cape Verde, our country was given a telephone exchange to service 40 people. It will be installed shortly by Marconi technicians. [Text] [Praia VOZ DI POVO in Portuguese 24 Jun 78 p 2]

CSO: 4401

BRIEFS

M-200H COMPUTER--Tokyo, 6 Sep--Hitachi and Fujitsu have announced development of what is claimed to be the world's largest and fastest computer system. The most sophisticated multipurpose equipment of their computer family called M series is claimed to be capable of processing data 1.6-1.7 times faster than IBM's ultramammoth computer system 3033. The product of the companies' cooperative effort to improve their competitive prospects on world markets also is claimed to have a competitive edge over IBM products in both capacity and prices. The first deliveries of the new system, M-200H, will begin in the second half of 1979, the announcement said. The lease price for the system will be 36 million yen monthly. [Text] [Tokyo KYODO in English 0838 GMT 6 Sep 78 OW]

CSO: 5500

NEW LOGARITHMIC ANTENNA INSTALLED FOR HANOI - SAIGON COMMUNICATIONS

Hanoi HANOI MOI in Vietnamese 24 May 78 p 3

[Article from Postal, Communications and Transportation Sector Column by D. N. "New Antella Installed"]

[Text] The cadres and workers of Telecommunications Center 1, Hanoi, manifesting a spirit of "daring to think and do," developed and installed a new horizontal logarithmic antenna at the radio station.

The logarithmic antenna is a type infinitely superior to other antennas and has only in recent years come into use in world broadcasting. It has an individualized structure, operates on a principle similar to mechanized electro-motion, and has excellent directional capabilities which will allow us a multi-thousand fold increace in our receiving and transmission capacities. The use of this kind of antenna for communications with remote places means the conservation of a great deal of energy expended on equipment.

Although the cadres and workers of the radio station had never installed such an antenna, they manifested their spirit of collective ownership to research that installation on their own. During the construction phase, they overcame many problems with materials and produced appropriate substitute spare parts themselves. The installation was completed and put into service for communications between Hanoi and Ho Chi Minh City effectively and with technical specifications being ensured.

6794
CSO: 5500

IMPROVEMENT NOTED IN TV, RADIO RECEPTION

Warsaw TRYBUNA LUDU in Polish 8 Sep 78 pp 1, 4 AU

[Report by C. Rudzinski: "Greater Range and Better Reception of Radio and TV Programs"]

[Text] At the beginning of this year there were in Poland over 7.9 million radio license holders and almost 7.2 million TV license holders. But how far can the inhabitants of the various regions of our country receive all the available programs and what is being done to improve reception? The Ministry of Communications has given us the necessary data.

The present TV transmitting network beams Program One mainly on meter wavelengths (Channels 1 to 12) and Program Two on meter and decimeter wavelengths (channels 21 to 41). The latter wavelengths will also be used in the final expansion of the Program Two network.

At least good reception of TV Program One is possible on some 95 percent of Poland's total area and of Program Two on just over 50 percent. This year good reception of TV Program One has been provided for Opole voivodship by the new high power TV station near Opole and for Konin and Przemysl by low power TV stations erected in these towns. Within the next few months a high power TV station near Sierpc will begin to operate and will provide good reception of TV Program One in Plock voivodship and in large areas of Ciechanow, Torun and Wloclawek voivodships.

Many localities in the hilly and mountainous areas, especially in the Bieszczady range and the Carpathian and Sudeten peaks, are still unable to receive TV Program One. The complete elimination of reception difficulties calls for the construction of almost 500 low power relay stations. This requires time and funds, because a single station providing reception within a relatively small area costs about 1.5 million.

The reception potential of TV Program Two is much more modest because it covers at present just over 50 percent of the country's area. For example, the inhabitants of several voivodship cities are unable to receive this program. No significant improvements in this situation are

expected in the immediate future because of great difficulties and costs.

But this does not mean that nothing is being done in this regard. For example, Opole voivodship can now receive TV Program Two. Thanks to the aforementioned strong TV station. The same program can also be received by Bardo, Elblag, Gorlice, Klodzko, Konin and Lebork, where low power relay stations have been put in operation. On completion of the Sierpc TV station Program Two will be received by Plock voivodship and large areas of Ciechanow, Ldmza and Wloclawek voivodships. A medium power TV station will shortly be completed near Lobez in Szczecin voivodship. This will enable parts of Koszalin and Szczecin voivodships to receive Program Two.

On 23 November of this year a new world plan of the radio wave frequency distribution comes into force. This plan was adopted in 1975 and has been ratified by the individual states. The former plan has been in force since 1948.

In Poland the new plan will reduce interference in medium wavelength reception and will make slight changes in the wave frequencies of Polish radio programs. These differences will amount to 1 khz, which is very little and which will not make it necessary to search for the Polish stations on the present radio sets, except for slight tuning adjustments.

CSO: 5500

BRIEFS

ENTEL CALLS BIDS--The National Telecommunications Company [ENTEL] opened national and international biddings this morning for the construction, installation and operation of a so-called global radio hookup system, a project which will require an estimated expense of 19 billion pesos. This hookup will allow larger towns in the interior to link to the national and international telephone network, the national and international telex service, and the national and international television distribution network. [Buenos Aires Domestic Service in Spanish 1600 GMT 15 Aug 78 PY]

SUBMARINE TELECOMMUNICATIONS CABLE--Buenos Aires, 2 Sep [TELAM]--Gen Eduardo Oscar Corrado, administrator of the National Telecommunications Company [ENTEL], goes to Rome today to sign a letter of intent on the installation of a telecommunications system by submarine cable which will link South America, Africa and Europe via the cities of Recife, Dakar, Senegal and Lagos, Portugal. The agreement will be signed by the presidents of the Portuguese Radio Marconi Company, the Brazilian Telecommunications Company [EMBRATEL], the French Post and Telecommunications Company, Italcable, Telesenegal and Intelcit of the Ivory Coast. [Buenos Aires TELAM in Spanish 0407 GMT2 Sep 78 PY]

NEW RADIO STATION--Buenos Aires, 29 Aug [TELAM]--A new branch of Buenos Aires Domestic Service, LRA 25 Radio Nacional Tartagal, will be dedicated tomorrow. This station will be the 23rd of the official radio networks controlled by the Communications Secretariat. The new radio station will broadcast on 540 kHz. [Buenos Aires TELAM in Spanish 1030 GMT 29 Aug 78 PY]

CSO: 5500

FIRM DISQUALIFIED AS BIDDER ON TELEPHONE SWITCHBOARDS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 23 Aug 78 p 23

[Text] Brasilia--L. M. Ericsson, an associate of Atlantica Boa Vista de Seguros, was disqualified yesterday for the bidding solicited by TELEBRAS [Brazilian Telecommunications Corporation] for the production in Brazil of CPA [stored program controlled] telephone exchanges, because its offer "did not fully serve the goals of the industrial policy of the Ministry of Communications or meet the additional requirements established." With this decision, TELEBRAS will take up negotiations with the second-ranking bidder, Standard Electric.

The Ministry of Communications explained, in announcing the disqualification of L. M. Ericsson, that the decision made by minister Euclides Quandt de Oliveira "was based exclusively on the recommendation of the TELEBRAS board of directors, since to date, that group has not received an official response to the inquiries made of the Central Bank, the SUSEP [Superintendency of Private Insurance] and the Equity Shares Commission on the business aspects of the connection between L. M. Ericsson and Atlantica Boa Vista.

In stating that Ericsson did not serve the goals of the telecommunications industrial policy, the ministry refused to say what additional requirements the enterprise failed to meet, claiming that TELEBRAS had not yet officially informed L. M. Ericsson about the matter. Another reason cited by the office of minister Quandt de Oliveira for the secrecy was the fact that "it would not be ethical to publicize details about the association of two enterprises which are continuing to participate in market bidding."

With the conclusion of the negotiations with L. M. Ericsson, TELEBRAS will enter into negotiations with the second-ranking bidder, International Standard Electric Corporation, which is affiliated with Brasilinvest, S.A., the Pereira Lopes/Ibesa group, the Union of Petrochemical Industries, and the Central Brazil Telephone Company. According to the Ministry of Communications, the negotiations with Standard will have to meet the same requirements, deadlines and demands established earlier for all of the qualified bidders. As happened with L. M. Ericsson, Standard Electric and its domestic partners will have a period of 30 days, which can be extended

for 15 more, to submit its documents. This period will begin as soon as the second-ranking bidder is notified by the TELEBRAS group.

The new classification will guarantee NEC [Nippon Electric Company] which, in association with the Docas de Santos company, ranked third in the bidding, a market for the stored program controlled switchboards. With the disqualification of Ericsson, the NEC moves up to second place, and if Standard Electric meets all the requirements in this second stage of bidding, it will produce the 50,000 terminals for the installation of the CPA system in the city of Sao Paulo, while the NEC will fill any orders exceeding 100,000 terminals per year, in accordance with the terms of the bidding specifications, which should come about beginning in 1981.

Basically, the additional requirements for this second bidding stage have to do with the stock control of the enterprise by Brazilians and a high level of domestically-produced equipment making up the CPAs.

The Ministry of Communications distributed a statement to explain the disqualification of L. M. Ericsson. The statement, which the press adviser and head of the office of minister Quandt de Oliveira said was not an official one, read as follows:

"Minister Quandt de Oliveira today, 22 August, approved the recommendation of the board of directors of TELEBRAS pertaining to the negotiations in progress with a view to a decision on international bid 001/76 solicited by TELEBRAS, for the establishment in the country of facilities for the production of CPA telephone exchanges.

The negotiations were being conducted with L. M. Ericsson, the first-ranking bidder to discuss the meeting of various requirements, which would be indispensable for the firm declared the winner of the bidding.

In the statement, TELEBRAS set forth the various reasons why the L. M. Ericsson offer did not fully suit the goals of the industrial policy of the Ministry of Communications or meet the requirements established.

As a result, on the basis of the decision adopted when the enterprises were ranked in order of preference, the negotiations with L. M. Ericsson were ended and TELEBRAS decided to begin negotiations with the second-ranking bidder, International Standard Electric Corporation.

These negotiations will be governed by the same requirements, deadlines and demands previously established for all of the qualified bidders."

5157
CSO: 5500

COBRA OFFICIAL DESCRIBES POLICY ON MULTINATIONAL GROUPS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 23 Aug 78 p 28

[Text] "It has been easy and even convenient for the leading groups in the domestic electro-electronics sector--the majority of them committed to multi-national groups--to maintain the level of technological and economic dependence on the part of Brazilian businesses. The Brazilian electro-electronics sector, although of recent origin, is governed almost totally by old and convenient styles of thinking," Carlos Augusto Rodrigues de Carvalho, superintendent and director of COBRA [Brazilian Computers and Systems] said yesterday during an interview he granted in Sao Paulo.

The Brazilian electronic computers industry, and COBRA in particular, "has the advantage of not being committed to these multi-national groups. It is for this reason that with the support of the government, we have been pioneers in demanding and requiring dealings on an equal-to-equal basis with foreign bidders," Carlos Augusto Carvalho said. In his view, "the positions defended by COBRA, in demanding that Brazilian industrial groups struggle harder for technological autonomy, do not represent excessive nationalism and are not radical positions."

"After all, demanding that the center of management decisions for domestic enterprises be in Brazil, that stock control be domestic, and that Brazilian technicians enjoy prestige is not being radical--it is being Brazilian and defending the real interests of the country," he said in conclusion.

"The gaining of awareness that it is necessary to be free of this dependence which almost always has predatory effects on our national interests is not found exclusively in COBRA, or in the Brazilian electronic computers sector, still in the embryonic stage. Happily, the same thing is happening today in the capital goods sector, where some industrialists, although on some occasions unfair to the government, have defended greater autonomy," the president of COBRA stressed.

In speaking of the competition of domestic enterprises with the multi-national groups, Carlos Augusto de Carvalho said that "in the electronic computer sector, multi-national groups have carried out real brainwashing

in Brazil in the past 20 years." Thus, he continued, with massive publicity and other tools, they have established the concept that foreign equipment is the best, and that Brazilian technicians are not capable of developing technology, which is inconsistent with the truth.

"COBRA, because it will not accept these concepts imposed years ago through publicity by the multi-national groups, is seeking to demonstrate the contrary, even if it is necessary to undertake a new brainwashing of those who make the decisions," Carlos Augusto said in the course of a discussion of a bid being solicited in Sao Paulo by the prefecture for the purchase of computer equipment for the highway system. "COBRA has not lost this bid yet. But the price offered by the foreign competitor is better. In terms of quality and technology, I can say that the domestic product is in no way inferior," he said.

COBRA dispatched invoices totaling 800 million cruzeiros from May of 1977 to May of 1978. The profit figure for last year, which was totally re-invested in the enterprise, which does not distribute dividends, was 115 million. COBRA's total invoices this year should come to about $100 million U.S., the equivalent of 1.8 billion cruzeiros. "And all of this has been done in less than 12 months of industrial activity," Carlos Augusto said.

"These figures suffice to demonstrate to Brazilian business groups that it is possible to develop technology in Brazil and to achieve relative economic independence," he concluded.

5157
CSO: 5500

BRIEFS

RADIO BROADCASTING CONGRESS--A network of radios headed by Radio Guaiba, Gaucha and Farroupilha will broadcast the opening session of the 11th Brazilian Congress on Radio Broadcasting, to be held in Caixias do Sul on 19-22 September. This congress is sponsored by the Brazilian Association of Radio and Television stations and will draw approximately 500 representatives of radio broadcasting stations throughout the country. Communications Minister Euclides Quandt de Oliveira and the state governor will speak at the opening session, which will begin at 1930. [Porto Alegre Radio Guaiba in Portuguese 0200 GMT 6 Sep 78 PY]

NEW RADIO STATION--Campinas--The telecommunications minister inaugurated a new radio station here yesterday. Radio Educadora FM belongs to the Radio Bandeirantes network. [Sao Paulo Cadeia Verde Amarela in Portuguese 1000 GMT 5 Sep 78 PY]

CSO: 5500

INTEREST EXPRESSED FOR USING 'LANDSAT' REMOTE SENSORS

Montevideo EL DIA in Spanish 13 Aug 78 p 20

/Text/ The Uruguayan Government, through the Secretariat of Planning, Coordination and Information, has expressed interest in utilizing remote sensors to make use of information which can be obtained by satellites regarding natural resources and agricultural programs.

Because of this, Pierre-Marie Adrien, an expert from the Inter-American Development Bank, is now in Montevideo, and he has already given some talks and provided information about the possibilities offered by the satellite system.

Several Latin American countries are using, or developing the capacity to use, the remote sensors.

These devices are "Landsat" satellites, which make possible the development of sophisticated research programs.

The remote sensors make it possible to inventory crops and timber resources; to learn about both surface and subsoil hydraulic resources; to map soils as an aid to setting development priorities; and to identify geomorphological characteristics associated with probable mineral deposits.

An unusual characteristic of the sensors is that they acquire information about the earth's surface and its atmosphere by means of systems which measure spacial, spectral and temporal variations in the electromagnetic energy emanating from the terrain being scanned. In this way, a large amount of data is generated, which can be processed by a computer to obtain a great deal of information.

Brazil was one of the first Latin American countries to utilize the system, having installed a ground station in Mato Grosso State to receive and process information.

This station covers parts of Argentina, Uruguay, Chile, Ecuador, Colombia and Venezuela, and all of Paraguay, Bolivia, Peru, Surinam and Guyana.

Argentina, in turn, is preparing to install its own station, which will enable it to develop programs throughout its territory and will make it possible for areas in Bolivia, Chile and Uruguay to benefit from the system's operation.

9085
CSO: 5500

ANTEL TO SET UP TELECOMMUNICATIONS SATELLITE

Montevideo EL PAIS in Spanish 15 Aug 78 p 7

/Text/ The Executive Board of ANTEL /National Communications Administration/ has decided to install a ground station for direct international communications by satellite.

This project, which is included in the 1978-1982 Five-Year Plan approved in principle by the government, will constitute an important step toward the improvement of the present level of international and domestic service.

According to a recent announcement, the plan embraces, among other projects, new microwave systems covering 1,500 km which will link not only all the country's capitals but also its most important cities. The national telephone network will be linked with the Brazilian network through the Santa Ana-Rio de Janeiro system; and there will be a new telex exchange and an increase in domestic and international circuits.

Acquisition of Equipment

As a first step toward installation of the ground station, international bidding has been called for. Those with whom ANTEL contracts will be responsible for supplying, installing and initially maintaining the telecommunications equipment for 4 years.

The ground station will also include microwave facilities, a telephone complex with associated switching equipment, related apparatus and spare parts.

This equipment should meet Intelsat specifications as well as the recommendations of the CCIR /expansion unknown/ and the CCITT /expansion unknown/.

9085
CSO: 5500

BRIEFS

SATELLITE COMMUNICATION CENTER--Prime Minister Mamduh Salem, and the minister of transport, communications and maritime transport Dr Naim Abu Taleb, will open the first artificial satellite-linked telephone exchange centre next Sunday at Maadi. The centre will make available 120 contact circuits with five countries: United States, Saudi Arabia, Kuwait, France and Britain. Each country will have 24 circuits for the service of businessmen, as well as Arab and foreign investors. The centre will improve contacts with other countries, especially as the renewal of Cairo telephone network has almost come to an end, said an official at the Ministry of Transport. The centre will also make available another 120 telegraph circuits to run the telegraphic service between Egypt and these countries, he pointed out. The centre which was set up at Maadi cost L.E. 10 million, he said, adding that contact through this centre will be available later with Canada, Argentine, Belgium, Holland, Sweden, Denmark, Norway, Finland, Romania, Nigeria, The Ivory Coast and the Sudan. A TV contact will also be made between Egypt and the rest of the world through this centre so that any important event could be carried live, he pointed out. The Telecommunications Authority yesterday made a decision to set aside four circuits for contact with the Sudan, he said.--GSS. [Text] [Cairo THE EGYPTIAN GAZETTE in English 11 Sep 78 p 3]

CSO: 5500

REASONS GIVEN FOR TELECOMMUNICATION PROBLEMS

Damascus AL-THAWRAH in Arabic 23 Jun 78 p 10

[Article: "What Is Behind the Problems of the Telecommunications System?"]

[Text] Conditions and services are deteriorating in the telecommunications system. New projects are not carried out and telephone stoppages are on the increase.

What are the reasons for such deterioration? Could it not be stopped through common efforts? What are the difficulties? Could not the level of telephone, telegraph and telex services be raised in a way that would achieve the objectives for which the system was established, carry out the plan, provide good maintenance and better service for citizens?

Such questions are being asked by the people, and it has become necessary to discover what is behind these conditions and to consider the problems that hamper the system.

Our newspapers and writers have observed in recent years the apparent deteriorating conditions in the system. What is needed now is to consider background events and conditions. We shall highlight such events in order to remind the various parties of their responsibilities. The system is not responsible for a great many of the telephone line faults. This is evidenced by 14 telegrams in 3 months of 1978, sent to the ministries and organizations in both the public and private sectors.

Another point is that the telephone network in a number of areas has exhausted its usefulness due to mere obsolescence and the frequent opening of cable joints, which decreases cable resistance and deprives it of many of its technical characteristics.

The increase in cable defects during the last 2 years could be attributed in particular to the excavations in Sossia and also to digging by the traffic department and other groups in the public and private sectors. Add to this the lack of proper drainage to take care of rain water, which increases

defects. Following rain, Damascus streets practically turn into swamps and pools, which find their way to inspection stations and telephone cables.

When one takes into consideration the time needed to determine and locate the problem, make repairs, in addition to the unavailability of needed materials in warehouses in required quantities, the lack of labor and contractors for necessary digging, crowded streets and long waiting periods until required digging is approved, one would realize the extent of difficulties which the system encounters in dealing with both officials and citizens. This is especially true since approval of the material and human resources required to do the job is the province of people in the central administration. In addition to this, there is the lack of hand tools, wooden poles and replacement parts for manual and half automatic transformers bought from the Arab Company for Electric Industries, which have not yet been delivered.

The means of transportation are practically nil in the province of Damascus due to the expanded city area and the increase in the number of lines and centers, to an extent that even minimum service is hard to insure due to the obsolescence and deterioration of lines. Crews in charge of repairing lines travel from one place to another on foot due to lack of means of transport.

There is inequality as to overtime between maintenance workers and others. The former are deprived of overtime compensation.

The inability to carry out the various planned projects is attributed to lack of needed materials and skilled labor. Another important remark, it is time for the system to replace metal cables with ground plastic cables, since most countries have ceased to use the former type. Also, the new areas to be developed, in accordance with the new plan of the Housing Ministry, should be studied carefully and in detail in order to be able to insure the areas' telephone service, in cooperation with all ministeries.

Construction of the electronic automatic distributor has been completed, however, the organization has not begun installing the needed network due to the unavailability of materials and labor.

The responsible authorities should also start carrying out the fourth, reserve, 5-year plan as soon as possible. Any delay in this threatens to stop telephone service for 7 years, which is the minimum time needed for installing a new service, what with construction requirements, public invitation to bidders, securing the needed funds, establishing letters of credit and approval of the project by the State Planning Agency.

Expanding the Telephone Network

The number of lines should be increased in the provinces, and the automatic telephone should be put into operation. Under present conditions there is

quite a delay in answering calls, and a great number of them are cancelled. The number of telegraph lines should be increased in the various cities to insure the jointex service, and to relieve the Damascus telegraph service of a great deal of pressure. The international telephone lines should be increased also, until the international distributor is installed. Such an increase in lines should diminish the provinces' complaints and the pressure on Damascus international lines.

The administration in the province of Damascus should be divided into separate, independent offices, each handling its contracts, having its own technical bureau, installation, network section, etc. Each office should have its own head, reporting to a general director. Such a division is bound to create a spirit of competition among workers in the various offices, and consequently insure better production and better service.

Needed also is a reserve generator for the newly established sections, pivotal cable, telex, international positions and jointex. Frequent power failure is causing stoppage and hindering operations in the various parts of the system.

The formation of a technical group is needed to restudy the city of Damascus' network, in an effort to make it conform with the city's layout and its buildings. Thus, the old network should be replaced and expanded, since the present volume of operation far exceeds the capabilities of those working in research, administration and maintenance, due to the continuous expansion of the city itself.

9298
CSO: 5500

PROGRAM FOR SOLVING ALEPPO TELEPHONE PROBLEMS OUTLINED

Damascus AL-THAWRAH in Arabic 30 Jun 78 p 10

[Article by Abdul Ghafour Sabouni and Omar Nayrabi: "Aleppo's Telephone Crisis Will Soon Be Solved"]

[Text] In relation to the telephone crisis in their city, Aleppo residents like to tell the following story. A man whose wife gave birth to a baby boy immediately submitted an application to the telephone service requesting a telephone in the name of his infant. When the employee expressed surprise at such an early application the man replied, "By the time we receive the telephone my son will be a young man."

Another story that circulated in Aleppo is that a man on his death bed asked his family to follow up his application for a telephone, which was submitted 15 years before.

These biting jokes are obviously no more than letting off steam by those disappointed people for the delay in answering their requests. What are the reasons for such delay?

Officials at the telephone agency say that the reason is the abundance of applications and the scarcity of telephones. However, we have learned that the problems will be solved in the current year due to the expansion contemplated in accordance with new plans to create new telephone networks.

In an interview with engineer Tawfic Tabbakh, director of the telecommunication system, we asked him about his projects for the current year.

He said that Aleppo projects are of three types, the distributors, networks and installations. As to the automatic distributors, the Qam-al-Wazir's distributor has been enlarged by 2,000 numbers to 10,000, which is the maximum. The work has now been completed and the new numbers have been in operation since the second quarter of this year.

Enlargement of al-Sulaymanieh distributor is being done in two stages. The first is to add 2,000 numbers, raising its capacity to 10,000. This stage

has been completed and in operation since last month. The second stage is to add a new distributor with 2,600 numbers. This work has been started and is expected to be completed by the end of this year.

[Question] What is the program for the new network?

[Answer] We have a program for 1978. It aims at expanding the city's ground networks and covers its various quarters. This has been carried out in al-Ashrafiah quarter, where three groups have been installed, each containing 150 principal lines. Consequently, all applications submitted through 1972 have been filled. We are also in the process of expanding Qahwat al-Sha'ar section.

In the quarters of al-Bab al-Qadim and al-Halwaniah, we are installing two distributors, each with 150 line capacity. The work is expected to be completed during July. We are also expanding the ground network in the quarters of Bustan al-Pacha and al-[?Halk], adding 150 lines to each.

[Question] How are the applications for telephone service met?

[Answer] This is done in accordance with the plan which envisages installing 750 lines in the first quarter of the year, a goal that has already been reached. We also expect to install 950 lines in the second quarter.

[Question] Are there any other projects?

[Answer] Yes, we have what we call the rural plan, an example of which was the project of installing a network between Akhtarin and Azaz in 1977. This, however, could not be accomplished due to some technical deficiencies.

[Question] Could you tell us the projects which are in progress at this time?

[Answer] We are working on the following projects:

1. Renovation of the Aleppo-al-Bab-Mambij-Jarablus network so that we can install conduits in order to increase connections between these centers.

2. Renovation of the network Aleppo-Azaz-'Afrin-Janrires.

3. Carrying out the project Kafr-Naya-Tal-Rif'at.

4. Installing a network between al-Thawrah city and Mafrak al-Thawrah, where two telephone circuits are being installed to insure supplying the network with conduits, due to increased exchanges between Aleppo-al-Tharah and al-Thawrah-al-Raqqah.

5. The renovation of the external network between [?] Dayr-al-Zawr-al-Hasakah.

6. Building public telephone centers in the province of al-Raqqah.

Engineer Tawfic Tabbakh concluded by saying, "From what I have said, it is obvious that Aleppo's responsibility is not restricted to its province alone, instead it extends to comprise the provinces of Idlib, al-Raqqah and Dayr al-Zawr.

"We work under the guidance and patronage of our commander, the struggling president, Hafez al-Assad, who cares for all sectors of public service."

9298
CSO: 5500

BRIEFS

EXPANSION OF TELEPHONE SERVICE--The Central Department of the Telecommunications System has taken the necessary steps to speed up construction of buildings needed to house the light electronic telephone junctions in the districts of Babbilah, Mulayhah, Jaramana, Malula, Qarah, Deyr-Atiyeh, Yabrud and Quteyfah. This is done in an effort to provide automatic telephone service for citizens. On the other hand, the department of telecommunication system in the province of al-Suwayda' is establishing new telephone lines in the capital, al-Suwayda'. Following the establishment of these lines numbers will quintuple. It has also been decided to add the number 2 to every telephone number. [Text] [Damascus AL-THAWRAH in Arabic 28 Jun 78 p 8] 9298

NEW LONG DISTANCE RADIO/TV TRANSMITTER--Mr Ahmed Iskander, minister of information, yesterday inaugurated the new transmitting station in Sabbourah. After the ribbon cutting, he and ceremony attendees inspected the 600-kilowatt station replacing the one of 100-kilowatt capacity. The minister stressed that the record time of 5 months from signing of the contract to completion of the station will be a great incentive to the broadcasting and television agency to continue to carry out its projects with equal enthusiasm and vigor. The new station will cover southern Syria, Palestine, Jordan and the northern part of Egyptian Arab Republic. [Excerpts] [Damascus AL-THAWRAH in Arabic 16 Jun 78 p 8] 9298

CSO: 5500

TEN-YEAR PLAN FOR TELECOMMUNICATIONS NETWORK DEVELOPMENT

Ndjamena INFO TCHAD in French 27 Jul 78 pp 2-4, 5

[Article by CHADIAN PRESS AGENCY; "Telecommunications in Chad: A Ten-Year Plan for Living in the Telephone World of Today"]

[Text] We have frequently emphasized, and justly so, the need to develop means of communication to release Chad from its shackles. This unshackling cannot be achieved, however, without giving telecommunications its due measure of consideration. This sector has not kept up with the demands of growth. The most patent example is telephone communications. In N'Djamena, where the 2000 line network is more than saturated, service requests pile up beyond the PTT's ability to satisfy them. The most it can do is to take lines away from certain subscribers in order to satisfy others, which poses problems. Furthermore, the shortage of lines creates disparities. In certain areas considered to be outside the urban perimeter (Moursal, for example), subscribers must pay exhorbitant charges for installation of service: between 200,000 and 400,000 francs. The installation charge within the urban perimeter is 12,000 francs. Telephone communications with the very few scattered rural towns being served--Sarh, Moundou, Abeche--become a real exercise. The sight of subscribers shouting at the top of their lungs to make themselves heard to the party at the end of the line recalls the first years of telephone history.

At a time when the country appears to be getting underway economically with the inauguration of various projects, telecommunications development is an imperative need. It is in this perspective that the Ministry of Posts and Telecommunications has activated an ambitious 10-year plan (1978-1987) for developing the national network. This plan is designed to respond to the need to unfetter the country--the Goudji satellite earth station is an initial step--and the need to upgrade the domestic network. In order to upgrade the domestic network, however, it must be provided with a base by improving the N'Djamena sector.

Improvement of the N'Djamena telecommunications network constitutes "Phase Zero" of the 10-year plan. The cost of this project, totalling 1.32 billion CFA francs, is being financed by the FAC (Aid and Cooperation Fund).

The project is already being implemented by way of the new telephone exchange being built by the Societe des Cables of Lyons. The first objective of this exchange will be to expand the network with the addition of 2400 new lines, which together with the 2000 lines of the old exchange will bring the total number of lines to 4400, and will permit the absorption of the long waiting list of subscribers. The old exchange will utilize the "brain" of the new one, and work has already begun to link the two exchanges by an underground cable. The total capacity of the new exchange will be 8000 new lines. Besides expanding the network, the plan calls for installing the latest type equipment (according to the technicians), and totally rebuilding the underground cable system of the capital so as to provide telephone subscribers a better grade of service. The new exchange will also permit a reduction of the disparities in charges to subscribers.

In the opinion of the director general of the Ministry of PTT, Mr Ballet, existing legislation must be revised so that rates can be adjusted and a single, more reasonable rate structure applied to all subscribers. The development of international communications will be progressive. The first phase of satellite communications will include France alone. By April, certain N'Djamena subscribers will be able to dial French subscribers automatically (without operators). The old exchange will be provided with 1000 new units of equipment for this purpose. The satellite telecommunications network may be extended later to other African and Western countries.

It is true that the plan favors N'Djamena initially. But this proves necessary, since, as Mr Ballet points out, N'Djamena's economic weight is an important factor. The extent of its demand for telecommunications and its large number of potential subscribers make this city the most important economically. The N'Djamena network presently has 2000 lines, while Sarh and Moundou each have 200, and Abeche 100. The ability of telecommunications to pay its way in Chad therefore depends on N'Djamena. If the N'Djamena project were operational, PTT revenues would be able to absorb the current provincial deficits. While emphasizing the public service character of PTT rather than its profitability, Mr Ballet nevertheless stated that in order to better satisfy the public's needs, the service must produce more revenue. The Ministry of PTT plans to install public telephone booths in the near future. Means for assuring the safety of these booths must be worked out with the mayoralty.

Phase 1 of the 10-year plan will upgrade the principal developmental axes (N'Djamena, Sarh, Moundou, Abeche). Communications between these exchanges are presently handled by high frequency radio systems. These systems are old (average age is 20 years) and are moreover very sensitive to atmospheric conditions, which makes communications highly variable. The development of telecommunications in the provinces faces a major problem: geographic distances. The Ministry of PTT has concluded that satellite communications is the most appropriate and economical. This phase will include

the installation of a second earth station at N'Djamena to serve Moundou, Sarh and Abeche. Thus, when these cities are equipped with the automatic exchanges being planned for them, they will be able to communicate directly with subscribers in N'Djamena and among themselves.

However, communications beyond the country's borders must transit N'Djamena. The "International Telex Transmit Exchange" will be installed there. The first provincial automatic exchanges are scheduled to be placed in service in 1981. In that year also, Bongor, Bol and Mao will be linked to N'Djamena by means of microwave systems.

The plan envisions equipping the isolated towns of Faya, Am-Timan and Ati with automatic exchanges around 1985. Microwave systems will be installed at the same time to link Moundou and Doba, Moundou, Kelo and Lai, Abeche and Biltine, and Ati and Mongo. In the final phase of the plan (1987) these systems may also be used to extend communications between N'Djamena and Massenya, Sarh and Koumra, Bongor and Fianga, and Fianga, Pala and Lere. Certain small population centers will continue to be served by high frequency radio; however, these systems will be improved. It will be a long time before Chadians will live in the telephone world of today, but meanwhile the future is rich with promise.

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INCOME FROM TELECOMMUNICATION SERVICE REPORTED

Addis Ababa THE ETHIOPIAN HERALD in English 27 Aug 78 p 5

[Text] The Ethiopian Telecommunications Service expects an income of a total of 39.6 million Birr both from local and international telephone, telegram, telex and other miscellaneous services, a spokesman told the ETHIOPIAN HERALD.

The spokesman said that ever since the upsurge of the popular revolution in February 1974, efforts have been made to alleviate problems of communications throughout the country. Accordingly, thirty-nine new stations have been set up bringing the total number to 371. Thirty-seven already existing stations were upgraded and the number of employees has also been raised to 4,238, it was stated.

The spokesman further noted that there are about 60,000 telecommunication lines throughout the country. The Addis-Ababa, Dessie, Mekele, Asmara-Massawa line, Debre Zeit Nezareth, Dire Dawa, Harar, Jijiga lines and that of Jimma are making use with a microwave system. Direct dialing system has been introduced to the above mentioned towns except Mekele. The institution has planned to install in Gondar, Shashamane and Assab, the spokesman revealed.

However, the spokesman added communication lines in the Eastern, Southern and Northern regions have been damaged by the reactionary war of aggression unleashed by Mogadisho regime in the East and the traitorous separatists in the North. Feasibility study to reconstruct the devastated lines are underway.

As a matter of fact, the spokesman continued, only a few days after the recapture of Jijiga, a provisional communication system was established to link the area with other towns in the country. Similarly, efforts are being put up to make operational the Addis Ababa-Asmara microwave system, it was learnt.

The spokesman further noted that communication lines are introduced on the basis of priority. Thus stations are set up in places where economic activities are predominant and also in popula-

ted and strategic areas. Radio communication is being introduced in the remote areas.

There were plans to establish fifteen new stations until July 1978 in various areas and upgrade others. But only two stations were set up. Because of the problems created by the reactionary war of aggresson of Siad Barre, the secessionists and the prevailing shortage of building materials, the plan could not be fully accomplished, the spokesman noted.

It was also learned that to increase the capacity of telecommunications services, four new exchange buildings are under construction near the New Abattoir, Addis Ketema, Bole and the Old Airport areas. The buildings are expected to be completed in fifteen months' time and will have an initial 16,000 lines, which in the long run are believed to have 10,000 lines each.

One fourth of a million Birr has been allocated for the establishment of new stations in rural areas and upgrade others according to priorities, the spokesman concluded.

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NEW TELEPHONE EXCHANGE SYSTEM IN AKAKI

Addis Ababa THE ETHIOPIAN HERALD in English 16 Jul 78 p 1

[Excerpts] The newly introduced automatic telephone exchange system was formally opened yesterday in Akaki linking the town with other major cities and towns in the country by microwave.

The industrial town of Akaki, which had a manual telephone exchange unit was one of the towns planned to get rural microwave exchange system in line with the development project of the Ethiopian Telecommunications Service.

In the inaugural ceremony held at the site, Ato Girma Engdayehu, general manager of the Ethiopian Telecommunications Service stressed the significant role being played by communication and transportation services in the economic and social development of the country, and added that communication facilities are vital components of any developmental scheme.

Rural Exchange Systems

He said that the government of Revolutionary Ethiopia has long realized the important role being played by telecommunications in the national endeavour to improve the socio-economic standards of the masses. "This is why," he explained, "rural exchange systems have been given due considerations."

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CORPORATION LAUNCHES COMMUNICATIONS DEVELOPMENT PROGRAM

Monrovia THE LIBERIAN AGE in English 29 Aug 78

[Text]

THE Liberia Telecommunications Corporation is currently launching a $24 million dollar Communications Development program which is geared towards expanding and improving the country's present Communications System.

The Corporation's Managing Director, Samuel Butler, in an interview on this week said that part of this development implementation of the Corporation will include telephont extensions to new areas such as Ganta Voinjama, Zorzor and Tappita and added that this phase of his Corporation development program is already in process.

The Director said that this program is also to upgrade the country's Microwave Telephone Network and to introduce a direct international dialing system.

Meanwhlle, as part of its development program the Liberia Telecommunications Corporation is currently installing Telex Machines in Gbarnga, Greenville and other major rural areas to curb the delays caused by telegrams, Mr. Butler disclosed.

He said that by the end of this year his Corporation hopes to have all of the major areas of Liberia connected by telex, a development which, he said, is bound to ensure speedy delivery of messages.

CSO: 5500

INSTALLATION OF CTI AT TELESENEGAL REPORTED

Dakar LE SOLEIL in French 29-30 Jul 78 p 4

[Text] At 1600 hours on 28 July 1978, Dr Daouda Sow, minister of Information and Telecommunications with responsibility for Relations with International Organizations, inaugurated the CTI (International Telex Exchange), located in the TELESENEGAL headquarters building.

This new installation, costing 225 million CFA francs, was conceived and planned by the Senegalese International Telecommunications Company (TELESENEGAL).

The activation of automatic international telex service in Senegal on 1 July 1975 necessitated the installation of equipment that was relatively simple from the technical viewpoint, but expensive from the viewpoint of operations (manual handling of charges, double and triple numberings). It was not suited for modification to meet the growing complexity of international procedures.

The installation of the "International Telex Exchange" (commonly known as the CTI), interfacing the national and international networks, removes these constraints.

The immediate service advantages made available by the CTI (entirely electronic) to subscribers of the Senegalese network as well as to foreign networks that may utilize Senegal's international telecommunications facilities are the following:

CTI Capabilities

--It provides Senegalese subscribers with automatic access to the international telex network through a standardized procedure conforming to the recommendations of the CCIIT (International Telephone and Telegraph Consultative Committee), a specialized section of the ITU (International Telecommunications Union). A single code (00) accesses the international network, and format of the address is always the same to any country of destination.

--It provides automatic answerback from the addressee's machine (time and identifying code) to the caller. The caller thus knows, with certainty at all times, just when to begin his transmission. If the connection cannot be completed, the CTI reports the reason to the caller, thus avoiding useless repetition of unproductive calls.

--It is compatible with all types of signalling, hence permits interconnection with new countries. This makes diversified routing available to improve traffic flow.

--It offers alternative routes for diverting traffic and for handling overflow traffic. Thus when the circuits with a foreign country are interrupted or saturated, calls can take a second or third alternate route. This improves traffic flow during peak periods.

--By dialing a special code at the end of a call, the subscriber can instantly obtain the exact billable duration of his call and thus maintain his own accounting of charges.

--In case of certain causes of non-completion of the connection (OCC [called number busy], NC [international trunks busy]), the CTI can automatically reinitiate the call without the subscriber having to re-dial.

Billing

Information treatment of billing information registered on a magnetic tape for each call makes available:

--caller's telex number;
--called telex number;
--national and international circuit numbers;
--duration of call in seconds;
--time at which call ended;
--day, month and year of call;
--transaction number assigned to the call;
--the disconnect serial number assigned at the end of the call.

The "end of call" code enables the CTI to offer subscribers authenticated centralized subscriber billing.

The transaction number, the day, month and year, and the called number are available to the subscriber during his call, and enable him to formulate service calls or complaints in cases of problems or faulty service.

Availability of CTI to Neighboring Countries

Availability of improved international telex service is not limited to solely Senegalese subscribers. CTI's facilities can also be used by neighboring countries not having comparable equipment. In this case, by connecting that country's international service subscribers to the CTI as remote subscribers, the CTI can effect the billing of those customers and the international accounting with other countries for that country's network.

Improved Quality of Service

The inauguration of the CTI provides users an international service of excellent quality from the technical viewpoint (greater accessibility for preventive and corrective maintenance) as well as the operational (almost total automation of international telex service with excellent volume traffic handling capability).

Technical Achievement

Only a very advanced technology based on information could offer all these capabilities.

Actually, the CTI, manufactured by Eltex, is an all-electronic automatic telex switcher, controlled by a central computer.

This automatic switcher consists of two distinct equipment subsystems:

--common equipment (computer, magnetic tape unit, fast printer), and
--terminal equipment (to which the national and international trunks,and the customer lines, are connected).

It is equipped to handle all types of international originating, terminating and transit traffic.

Incoming semiautomatic and manual traffic is processed by operating positions equipped with keyboards that directly control the central unit (computer).

The overall processing function of the common equipment is organized like a modern multi-processor informatics system. It is designed to accomodate, by progressive adaptation, future growth in traffic volume and increased terminal equipment requirements, without interruption of service. It embodies the very latest generation of switching equipment.

The basic system has a capacity of 300 international trunks and 1300 subscriber lines. The telex billing and international telex accounting functions are performed by the central billing equipment associated with the CTI. This equipment establishes the correct charges for all originating calls from subscribers to the Senegalese domestic network, and for calls

from those subscribers to foreign networks who are directly connected to the CTI, for which calls, handled by the CTI in Dakar, the foreign network cannot establish charges at the origin.

The advanced technology of the CTI will enable it to provide entirely new services in the near future:

--abbreviated dialing;
--broadcast or multiple addresses service;
--deferred delivery service;
--high speed service at the 200 baud rate (present telex service is at 50 bauds).

With the inauguration of the International Telex Exchange, TELESENEGAL has enhanced our country's telecommunications network with another priceless link.

TELESENEGAL's many achievements--the Gandoul satellite earth station, the submarine cables linking Senegal to Morocco and the Ivory Coast, the International Telephone Switching exchange (which has enabled the automation of international telephone trunks)--have placed Senegal in a privileged position in the domain of world telecommunications.

The development and efficacy of Senegal's international telecommunications network will, beyond question, further enhance our cultural and economic interchanges with the rest of the world.

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BRIEFS

COMPUTER FIRM TAKEOVER--International Computers has taken over Integrand Scientific Computing, one of the biggest IBM-equipped bureaux in the country, in a move which--according to ICL--makes it the biggest bureau operation in South Africa. ICL director Brian Morley, who takes over the running of Integrand, says ICL Data Services, with a network of nine bureaux (including the new one), now has a turnover of about R10-million a year from 120 clients. No details of what ICL paid for Integrand have been released, but, says Mr. Morley, "it has a tremendous reputation and has been making substantial profits." Integrand, which has branches in Cape Town and Durban, both of which use the Johannesburg bureau facilities to process their work, will continue to operate under its own name. Total bureau turnover in South Africa is estimated at R60-million. Other leading bureau companies include Computer Sciences (owned by Anglo American) and Leo Computer Bureau (part of Sage Holdings). [Text] [Johannesburg SUNDAY TIMES in English 27 Aug 78 p 30]

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ROMEPALERMO CABLE: A 3600-CHANNEL SUBMARINE SYSTEM

Rome NOTE, RECENSIONI, NOTIZIE in English Nos 3-4, May-Aug 77, pp 115-135

[Article by A. Bennet, G. Bonaventura, A. Vincenti(*)]

[Text]

1. INTRODUCTION.

For some years ASST has been becoming increasingly conscious of a need to guarantee to users of the telecommunications services not only satisfactory electrical quality (noise, crosstalk, and equivalent), but also an improved continuity of service. This continuity is mainly dependent on the availability of main transmission lines, and is particularly necessary on international links where re-routing is more difficult in the event of a fault.

A problem of particular importance which faced ASST for some time was the availability of main transmission lines for the extension as far as Rome of submarine cable circuits terminating in Calabria and Sicily, which originate in Turkey, Egypt, Libya, Malta, Tunisia and Greece. During the planning of these cables their extension as far as Rome was, in fact, excluded for clear economic reasons. This therefore left the alternatives of allocating a dedicated duplicated terrestrial transmission path to all the circuits from the submarine cable terminal stations to Rome, or of establishing a further submarine cable link as a means of extending all these circuits to Rome.

Until now the first of these alternatives has been adopted as the submarine systems available were of limited capacity, and their cost per circuit mile decidedly greater than that of terrestrial systems. Recently this situation has changed with the appearance on the market of a system with a capacity of at least 3600 4 kHz channels which makes it possible to concentrate all the circuits from the

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above-mentioned cables into a single path, and this possibility was therefore immediately studied from the point of view of cost. This study showed that there was parity between the cost of a land circuit of 1200 km between Rome and Palermo, by way of a cable containing eight 2.6/9.5 mm (0.104/0.375") coaxial pairs, equipped with 12 MHz systems, and that of a circuit by way of a 3600-channel submarine cable abaut of 500 km lenght, the distance by sea between Rome and Palermo.

On the basis of these considerations and these results, it was decided to install such a system, having also taken into account that it would be possible to route to the centre and north of Italy some of the domestic traffic originating in Sicily, thereby improving also the continuity of the circuits used for this type of traffic.

2. System description.

2.1. *Capacity.*

The system is of the classic $N + N$ type with a single coaxial tube which carries both direction of transmission separated in frequency. The total frequency bands is about 45 MHz and the bands available for traffic in the two directions are 1900-19004 kHz and 27196-44300 kHz respectively. The unused frequency gap between the two directions is necessary to achieve an economic design of the directional filters. The A-B direction transmits the low band, and the B-A the high band.

The system can be provided with different multiplex options which give a capacity of 60,65 or 69 supergroups (secondary groups) each comprising either 60 4 kHz channels or 80 3 kHz channels.

2.2. *Frequency Translation Plans.*

The 60 supergroup capacity is achieved by the transmission of 4 supermastergroups (quaternary groups). The first three supermastergroups, in the basic frequency band of 8516-12388 kHz are translated to the positions 7,8 and 9 agreed by the CCITT for 60 MHz systems (Recommendation G 333/Plan 1), while the fourth has a different modulation from that agreed by the CCITT for supermastergroups 10 with the object of obtaining a gap of 528 kHz instead of 2728 kHz (fig. 1.A). In this case the line frequencies are 1916-18988 kHz and 27212-44282 kHz for the two directions respectively (fig. 2).

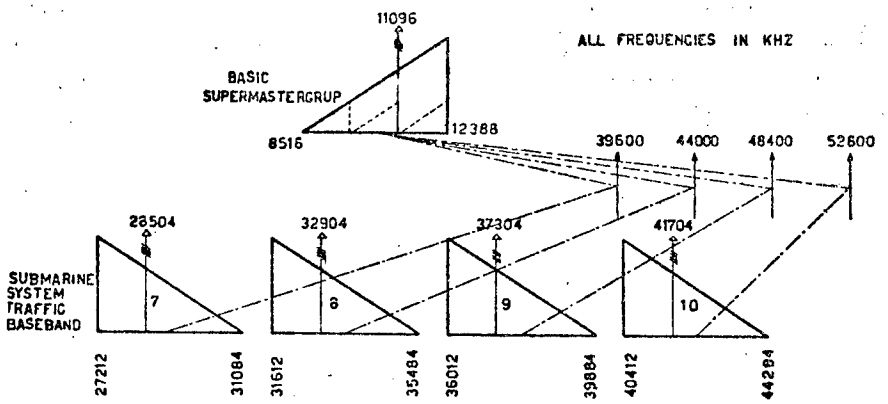

Fig. 1.A - *Frequency Translation Plan for 60-supergroup Capacity with Supermastergroup Interface.*

The same capacity of 60 supergroups can also be obtained adopting Plan 2 (G 333/Plan 2), simply by adding a pre-modulation stage to translate from the 15-supermastergroup assembly in the position 312-4028 kHz to the position 8620-12336 kHz. The corresponding line frequencies are 2020-18936 and 27264-44180 kHz (figs 1.B e 2).

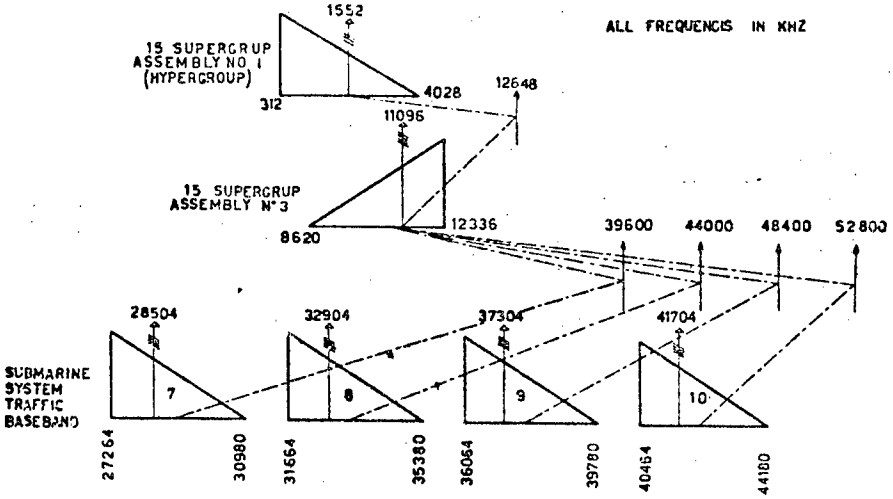

Fig. 1.B - *Frequency Tranlation Plan for 60-supergroup Capacity with 15-supergroup Assembly No. 1 Interface.*

The capacity of 65 supergroups is, however, based on the use of mastergroups (tertiary groups). The 60 supergroups are formed as in the first case, but with the positions of supermastergroups 8 and 9 modified, thereby permitting a further mastergroup to be

inserted between them. The line frequency bands are 1916-18988 kHz and 27212-44824 kHz, as in the first case, but with improved bandwidth utilisation by reduction of the inter-supermastergroup gaps (figs 1.C e 2).

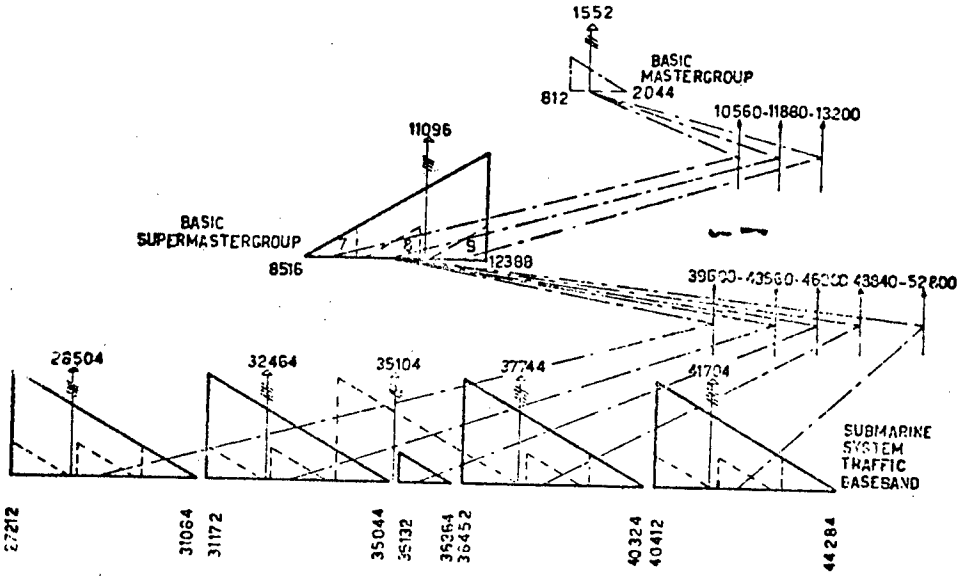

Fig. 1.C - *Frequency Tranlation Plan for 65-supergroup Capacity with Mastergroup Interface.*

The 69-supergroup capacity is obtained from seven assemblies of nine supergroups each (in the band 812-3036 kHz) and from one assembly of six supergroups (1556-3036 kHz). These assemblies are under-equipped 15-supergroup assemblies, which are separated by only 8 kHz. When using the system from 69-supergroups it is necessary to demodulate as far as basic supergroups in both terminal stations of the submarine cable system, since it is not possible to achieve economically a design of through-connection filter which could separate each nine-supergroup assembly from the adjacent one, with only 8 kHz separation between them. This plan uses the total available bandwidth stated in 2.1 above (figs 1.D e 2).

At the time of the selection of this system for the Rome-Palermo link, only the 60-supergroup version of the multiplex was available. For this capacity the input and output points of the system are taken from the 15-supergroup assembly distribution frame since, as stated above, the multiplex equipment for the 15-supergroup assemblies is not in accordance with CCITT recommendation G 333.

2.3. *Line Terminal* (Duplication, Regulation, Equalisation).

The frequency band corresponding to the system capacity, having been formed in the multiplex equipment, reaches the submarine

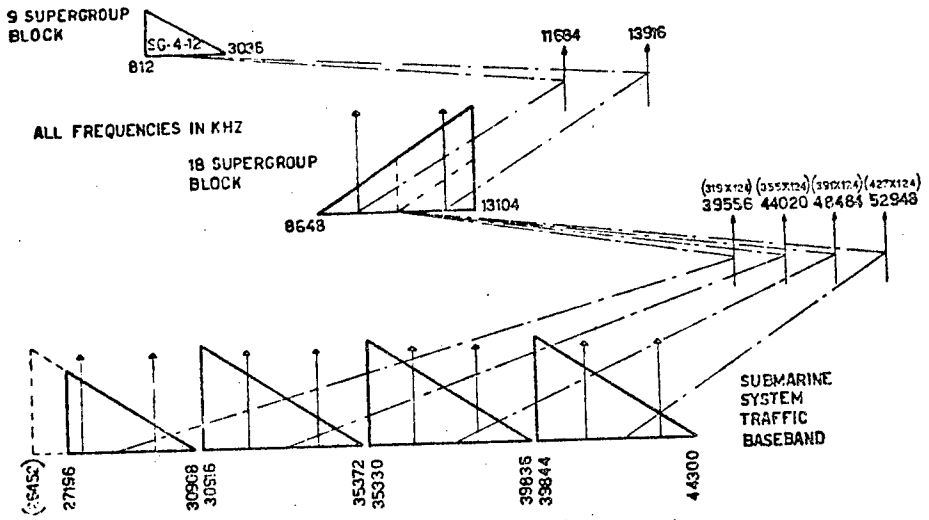

Fig. 1.D - *Frequency Translation Plan for 69-supergroup Capacity with Supergroup Interface.*

cable by way of the line terminal, which also performs the usual functions of remote power-feeding, system supervision and equalisation.

The terminal transmission equipment can be either duplicated or non-duplicated. The duplication extends from the hybrid coil

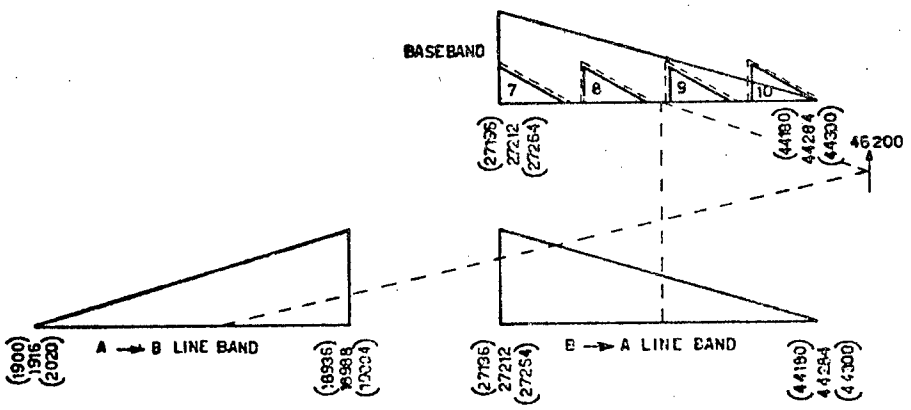

Fig. 2 - *Line Frequency Translation.*

where the wideband signal is formed, to the directional filters (these are always duplicated, but with manual changeover), and similarly on the receive side.

On the basis of experience gained up to the present time on submarine system terminals, and taking into account the calculated MTBF of 6.5 years for the wideband terminal without duplication, the latter was chosen for the Rome-Palermo cable, but at the same time the system was provided with spare plug-in units for all units containing active elements. The terminals comprise several fixed gain flat amplifiers, as well as the following equaliser networks:

a) Transmit path equalisers which are used to provide pre-emphasis to optimise the signal-to-noise ratio.

b) Receive path equalisers which equalise the nominal cable end-section, and remove the pre-emphasis.

c) Cable simulator networks to compensate for the difference between the actual end-section and the nominal, and also for variations in length due to repairs in shallow water.

d) Terminal equipment equalisers which compensate possible small discrepancies between the two transmission paths (duplicated terminals only).

e) Variable equalisers to compensate for the attenuation variations due to seasonal cable temperature changes.

The *A* terminal transmit path and the *B* terminal receive path contain in addition a wideband modulator for translating the baseband (high band) to the low band.

Normally in submarine systems there is no automatic level regulation since the range of temperature variations on the sea bottom is very limited. The pilot frequencies basically carry out the functions of:

a) Checking the continuity of the link.

b) Providing information on level variations due to temperature changes.

c) Initiating changeover in the case of duplicated terminals.

The three system pilot frequencies in each direction are transmitted at -10 *dBm*0 and their generators are non-duplicated.

For systems laid in water where the temperature variation is appreciable, it is planned to insert repeaters regulated by thermosensitive elements, but this will be limited to shallow water areas.

2.4. *Remote Supervision of the Submerged Repeaters.*

The supervisory system adopted is similar to that used for land systems; each repeater has two oscillators which send continuously one frequency in each direction of transmission. The supervisory frequencies are outside the transmission bands, so that measurements of the state of the system can be made while it is in service.

A simplified version is now available with a single oscillator in every repeater. The odd-numbered repeaters are checked from one terminal and the even-numbered from the other. It is planned to use this version only in the deep-water sections of a route.

The Frequency bands allocated to supervision are 1516-1716 kHz and 44484-45984 kHz.

2.5. *Remote Power Feeding.*

The submerged repeaters are supplied with power from the terminals by a constant direct current of 500 *mA* via the centre conductor of the coaxial pair, with the return via the sea. The fall in potential across each repeater at 500 *mA* is about 16V, and that of each inter-repeater cable section about 3V. This means that with the 95 repeaters of the Rome-Palermo cable the total voltage drop is about 1800V.

The principal constituent part of the power feeding equipment are:

a) Two constant current power units, one working and one standby, which generate the required line voltage from the station supply of 48V d.c. Each unit includes a 400 Hz inverter, h.t. transformer and rectifier, and regulation circuits which control the output of the inverter by a pulsewidth modulation technique.

In normal operation one power unit is feeding the line, the other an equivalent dummy load. In the event of failure of the unit feeding the line, changeover to the other unit is made automatically. Manual changeover may be made to enable the working unit to be connected to the dummy load for testing purposes.

The units at either end of the system are of opposite polarity, and share the system voltage between them so that each one is supplying approximately half, that is 900V in the case of Rome-Palermo. In the avent of complete failure of the repeater power supply at either terminal the system will automatically become single end fed from the other terminal.

b) Circuits which continuously monitor the line current and voltage, giving an alarm in the event of deviations in excess of predetermined limits, and shutting down the power units, if necessary for the protection of the repeaters, for excessive deviations which could be caused, for example, by a cable fault.

c) Cable terminating box; this contains, in addition to the physical termination of the submarine cable, the filter which separates the power feeding current from the transmission signals.

d) Dummy load; this comprises a number of variable resistors which are used to set up the voltage of the standby power unit to that of the unit feeding the line, to obtain the correct conditions for changeover, and to provide a range of test conditions for checking the unit not in service.

For systems greater than about 600 km in length a larger type of power unit is used which is capable of providing an output voltage up to 5000 volts. This is similar in principle to the equipment described above but has the following differences.

a) The inverters are separate units with a constant output voltage of 115 volts at 400 Hz.

b) Regulation of the output current is achieved by means of transductors within the power units.

c) The two power units at a terminal operate in parallel in a current-sharing mode, so that if one fails the other takes over the full load.

3. Submerged Repeaters.

The submerged repeaters contain two separate amplifiers for the two directions of transmission; one with a gain of 25 *dB* at 19 MHz, and the other with a gain of 36 *dB* at 45 MHz. The overload point is + 23 *dBm* for the low band amplifier and + 24 *dBm* for the high band.

With a 1.7 inch cable the resulting repeater spacing is about 3.3. nautical miles; with 1.47 inch cable it is reduced to 2.75 nautical miles.

After every 20 repeaters a submerged equaliser is inserted. Their necessity arises from the consideration that, for example, on a link of 500 km the total attenuation at 45 MHz is about 3400 *dB*, and allowing a maximum mis-equalisation at the terminals of ± 5 *dB*, the maximum discrepancy between a repeater gain and a cable section

loss would have to be less than about 0.05 *dB*. Since that is not economically achievable, the insertion of submerged equalisers is adopted. Both the submerged repeaters and equalisers are contained in the classic Housing. with a length of 2,407 metres and a diameter of 0,262 metres, which are already well proven for system of lawer capacity.

4. Cables.

For a 45 MHz system it is possible to use in deep water either the 1.47 inch cable already used in systems of lower capacity or the 1.7 inch cable which has been conceived specifically for high capacity systems. The choice between these two lightweight types is more an economic one than a technical one.

In fact, from the technical viewpoint the smaller number of repeaters used with the 1.7 inch cable (about 20%) will not substantially alter the performance and reliability of the link.

From the economic viewpoint, the present high cost of polyethylene, a petroleum derivative, means that in general the advantage is in favour of the 1.47 inch cable. The Rome-Palermo system uses the 1.47 inch cable, which has already been widely used for the ASST network of 1380 channel systems. The armoured cable is also a traditional type of 1.47 inch diameter, but for the shore ends, where additional screening is required, the diameter is 0.935 inches.

5. The Rome-Palermo Project.

The submarine cable has terminal stations at Palermo and Pomezio, resulting in a length abaut of 500 km. At Palermo the terminal is the existing ASST repeater station, and at Pomezia in the station built a few years ago specifically for the termination of submarine systems. From Pomezia the circuits are routed as far as Rome on a cable of 8 2.6/9.5 mm coaxial pairs suitable for use with 60 MHz systems, but at present equipped with 12 MHz systems.

The cable from Pomezia to Rome is laid entirely in ducts or in tunnels, and therefore has a reliability comparable with that of the submarine cable. The landing point in Sicily is 12.05 km distant from Palermo, and at the other end 7.25 km from Pomezia. In these land sections 0.935 inch coaxial cable is used.

The submarine cable route selected after a survey is shown in fig. 3.

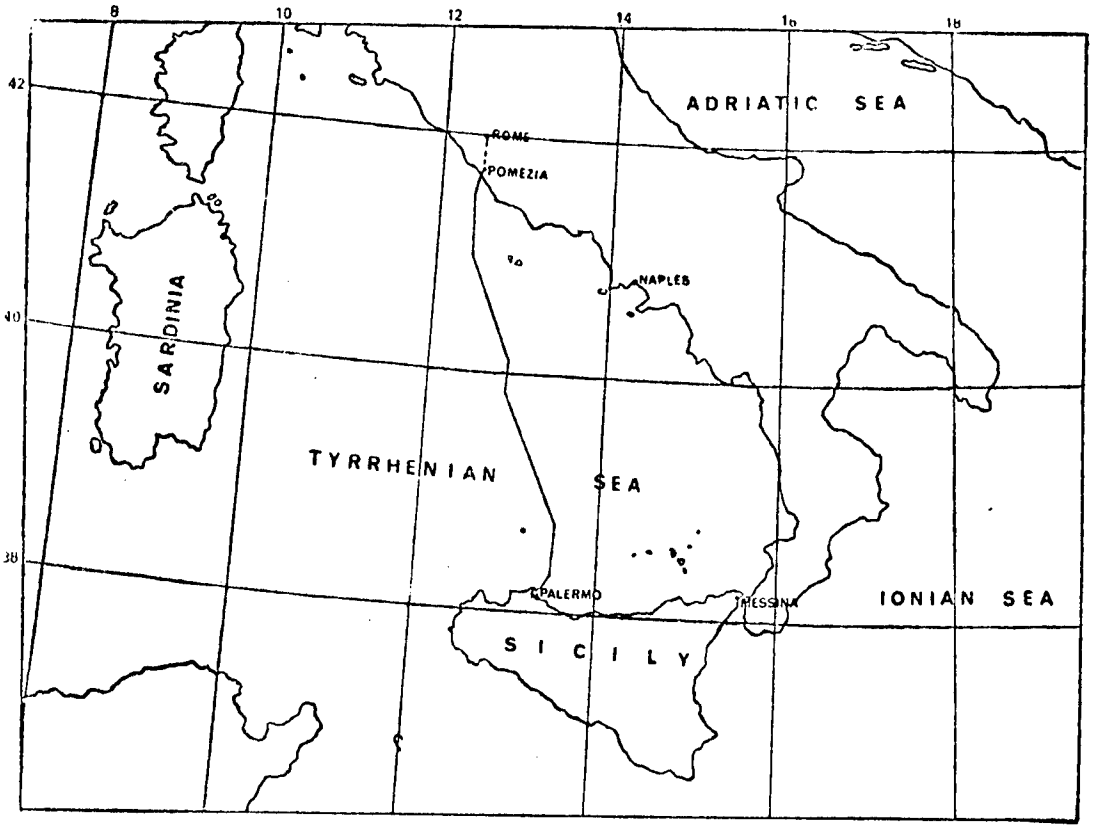

Fig. 3 - *Route Map of Roma-Palermo System.*

Ninety-five submerged repeaters, all of fixed gain, and 4 submerged equalisers have been inserted in the cable.

At Pomezia the inter-connection is made at the level of 15-supergroup assembly No 1, and all the circuits are extended to Rome where demodulation to lower multiplexing levels takes place.

At both terminals the system is energised from 48V d.c., and uses primary carrier frequencies of 124 kHz and 2200 kHz generated from a master oscillator of a type used with 60 MHz terrestrial systems, and having a frequency stability better than 1×10^{-8}.

Regarding the electrical performance of the overall system, the main requirement is that defining the permissible line noise, agreed as 2 *pWOp/km* in the worst channel and 1 *pWOp/km* as a mean of all channels, when applying a load of — 13 *dBm0* for every 3 kHz channel. This objective has to be met allowing margins for attenuation variations of the cable due to temperature changes, and for the repair cable which may be inserted during the life of the system.

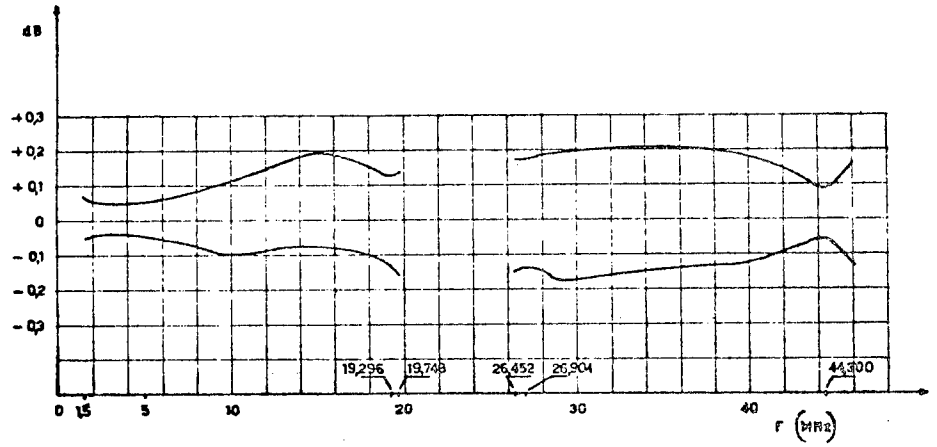

Fig. 4 - *Deviation from the mean value of the maximum and minimum values of repeater gain.*

These conditions must be saitsfied for a temperature range over the land and shallow water sections (up to 800 metres depth) of $\pm 17° C$ and in deep water of $\pm 3° C$, assuming the insertion of 0.5 nautical miles of repair cable in each shallow water section of the route.

6. Measurements made during manufacture of the cable and repeaters.

Before the system was laid certain measurements were carried out in the factory on the repeaters. In particular, for the 95 repeaters constituting the entire link an average gain characteristic as a function of frequency, and the envelope enclosing the maximum and minimum values, were derived.

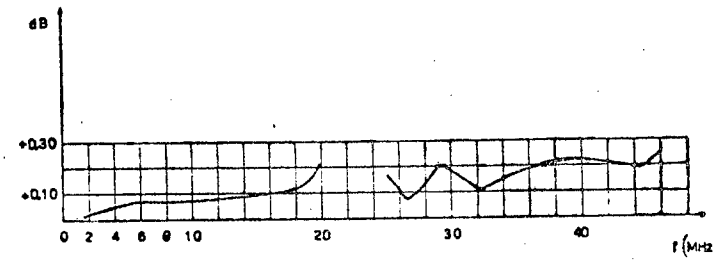

Fig. 5 - *Mean Value of repeater gain with respect to the nominal value.*

Fig. 4, show the spread of repeater gain values about the mean value of gain. The diagram gives an indication of the dispersion of the repeater gain values and shows a range of about ± 0.2 *dB* for the high band direction. In Fig. 5 the mean gain of the repeaters is compared with the typical value supplied by the manufacturer for both bands. It is evident that the difference increases with frequency, reaching a maximum value of 0.25 *dB*.

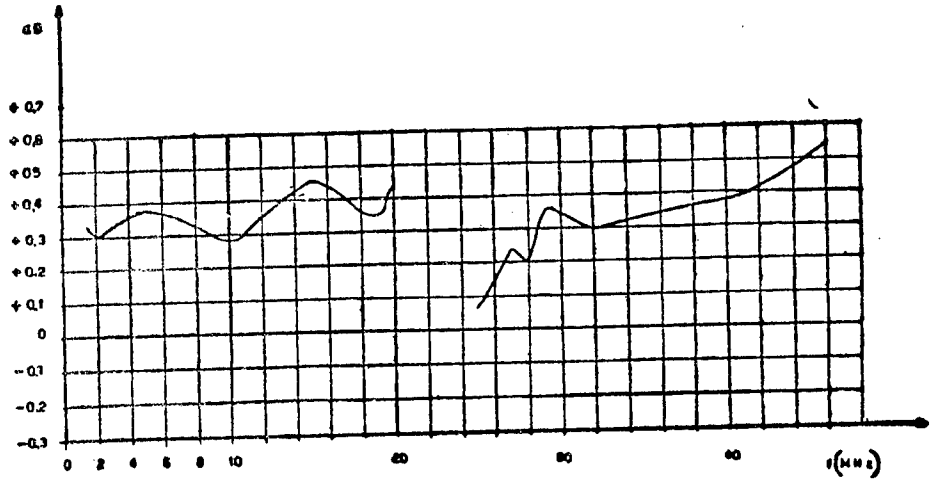

Fig. 6 - *Mean value of repeater gain with respect to the mean attenuation frequency curve.*

Finally, Fig. 6 shows the difference between the mean value of the repeater gain, and the mean attenuation frequency characteristic

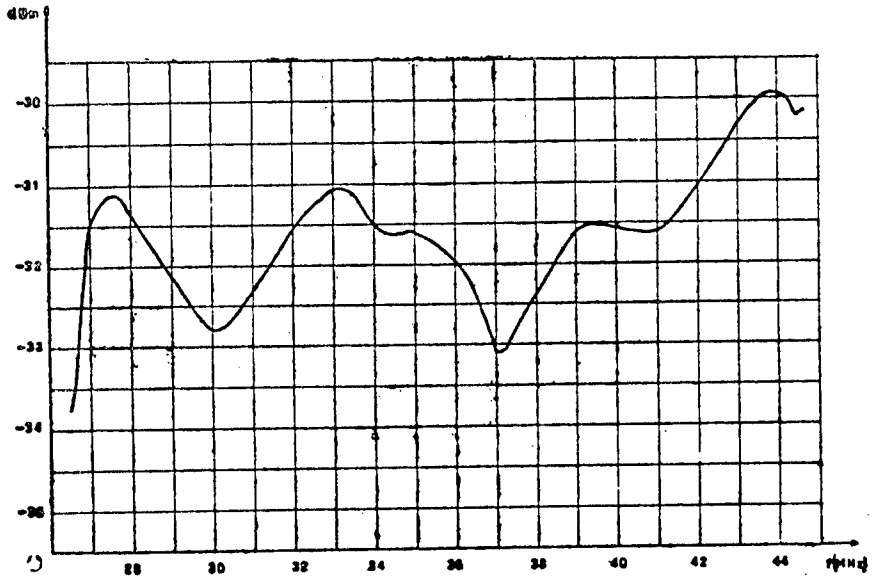

Fig. 7 - *Frequency response of cable and repeaters measured between 6 dB (cable head) Test Points A→B Direction.*

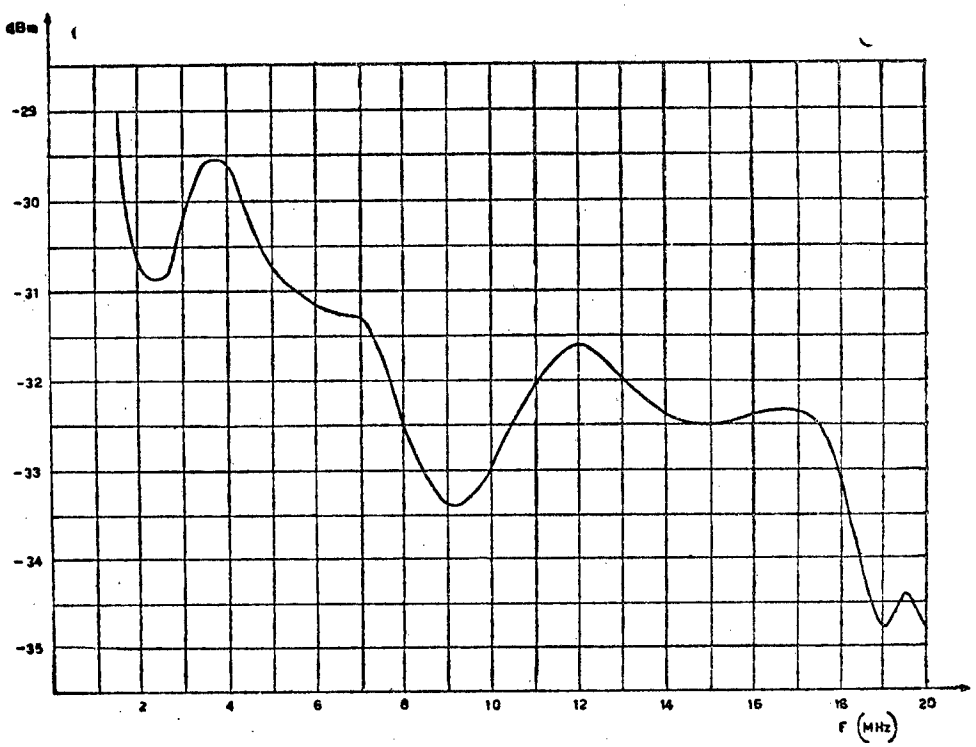

Fig. 8 - *Frequency response of cable and repeaters measured between 6 dB (cable head) Test Points B → A Direction.*

of the 1.47 inch lightweight cable at a temperature of 13° *C*, and for a nominal repeater section of 2.74 nautical miles.

For this purpose the mean gain of the repeater at 13° *C* was calculated by linear interpolation between typical values supplied by the manufacturer at 22° *C* and at 2° *C*.

The greatest deviations are in the high frequency band with a maximum at 44.3 MHz and all are positive (excess gain).

7. Results of the overall system tests Rome-Palermo.

On completion of the system installation a series of tests were carried out to ascertain the compliance of the system with the contractual specifications.

The results of the most significant tests, which give the best idea of the performance of the link are considered below.

7.1. *Level Frequency response of the system.*

Figs 7 e 8 show the characteristic, as a function of frequency, of the level at the input to the receive terminal for the two frequency bands 27264-44180 kHz at Pomezia (Rome) and 2020-18936 kHz at Palermo.

The mis-equalisation of 3 *dB* found at the Pomezia terminal, and about 5 *dB* at the Palermo terminal are due to the cumulative residual errors in the preceding equalisation blocks, and also to the unequalised block next to the terminal.

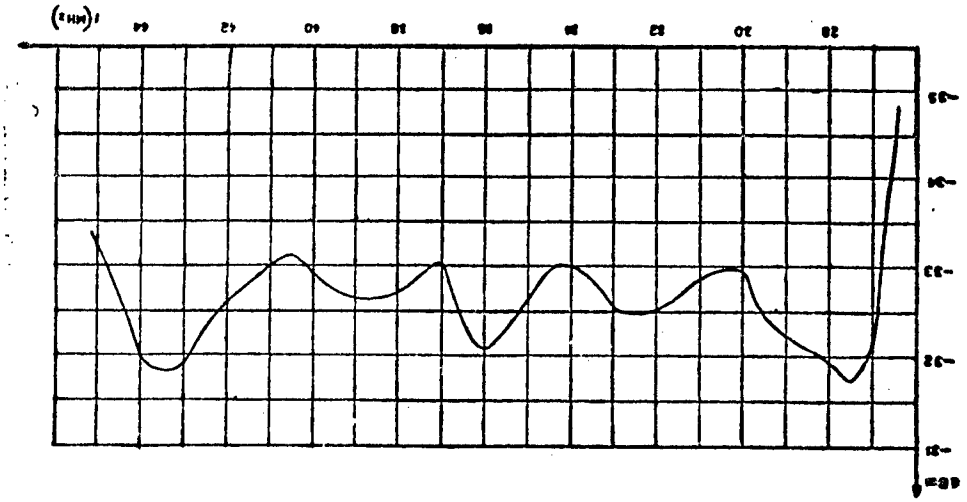

Fig. 9 - *Wideband frequency response after equalisation B → A Direction.*

The system, in fact, includes 1 submerged equaliser for each block of 20 repeaters, resulting in a total of 4 equalisers.

To meet the specified spread limits for each 15-supergroup assembly No 1 (in the band 312-4028 kHz), the terminal equalisation is carried out partly in the receive wideband path, and partly in each 15-supergroup path, both in the band 8620-12336 kHz, and the band 312-4028 kHz.

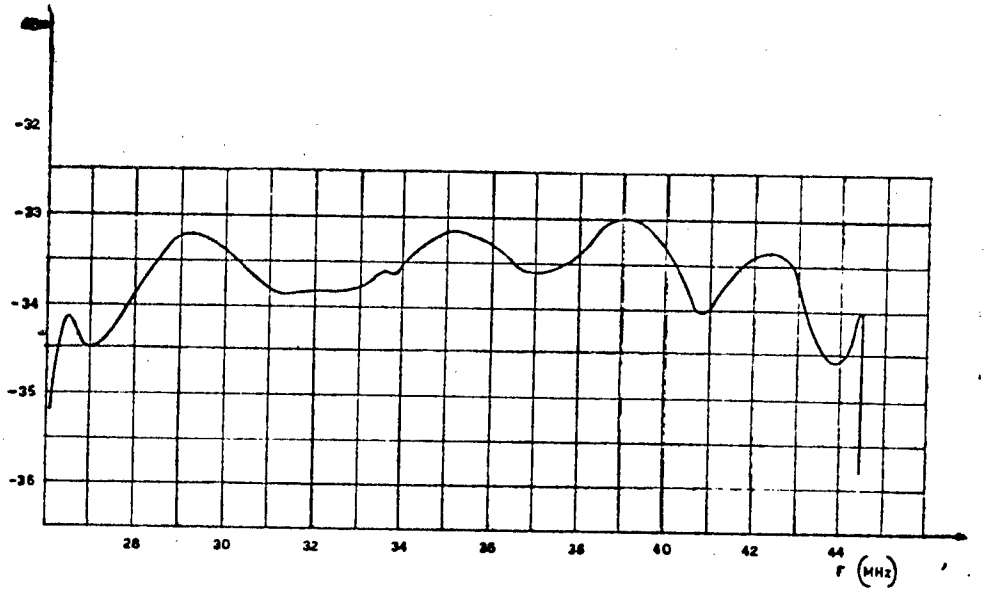

Fig. 10 - *Wideband frequency response after equalisation A → B Direction.*

Figs 9 e 10 show the level-frequency characteristic in the system baseband after equalisation.

The spread has been reduced from the initial values to 1.3 *dB* and 1.6 *dB* at Pomezia and Palermo respectively.

Finally, Figs. 11 e 12 show the level-frequency characteristics of the 15-supergroup assemblies in the band 312-4028 kHz. The maximum spread values are 0.81 *dB* and 0.56 *dB* at Pomezia and Palermo respectively, which are well within the requirement of the specification ($\pm$ 1 *dB*).

7.2. *Overall Noise.*

The overall noise (thermal and intermodulation) of the entire link was measured using the NPR method.

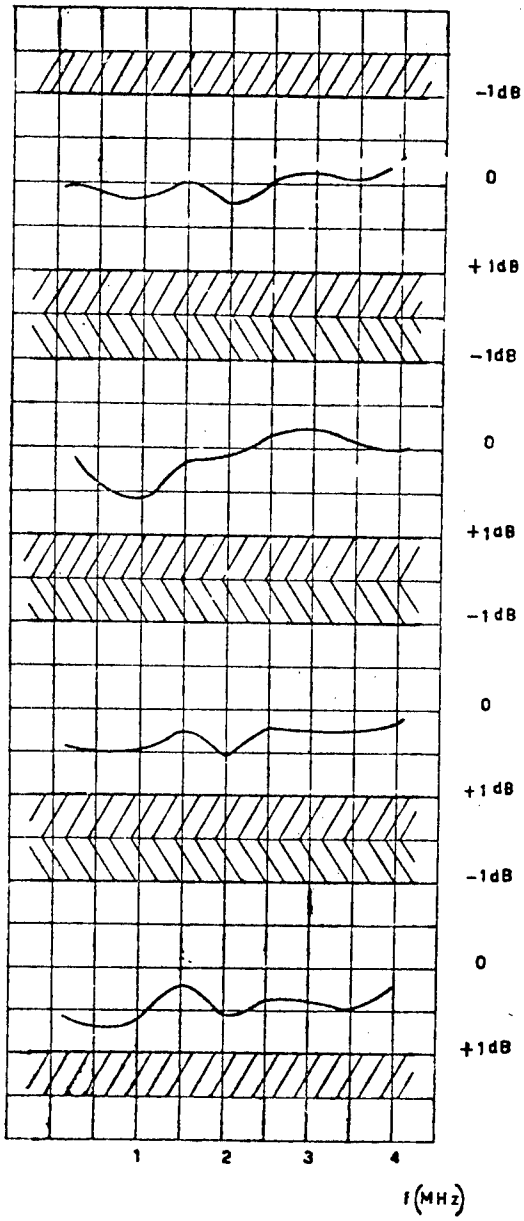

Fig. 11 - *Level-frequency characteristic of the 15-supergroup asemblies (band 312-4028 kHz) in the Rome-Palermo direction.*

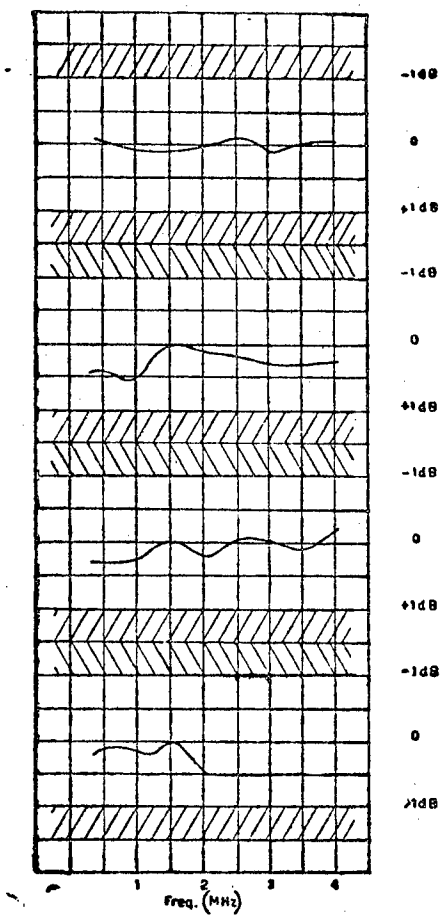

Fig. 12 - *Level-frequency characteristic of the 15-supergroup assemblies (band 312-4028 kHz) in the Palermo-Rome direction.*

The multi-channel load was calculated assuming for each channel a value of — 13 $dBm0$, giving, in the case of 4 kHz channels.

$$-13 + 10 \log 3600 = +22.56 \ dBm0.$$

The correction factor k, which converts the NPR value to that of noise referred to a point of zero relative level with psophometric weighting, is calculated using the equivalent bandwidth for a weighted 4 kHz channel, which, as is well-known, is 1.74 kHz, giving

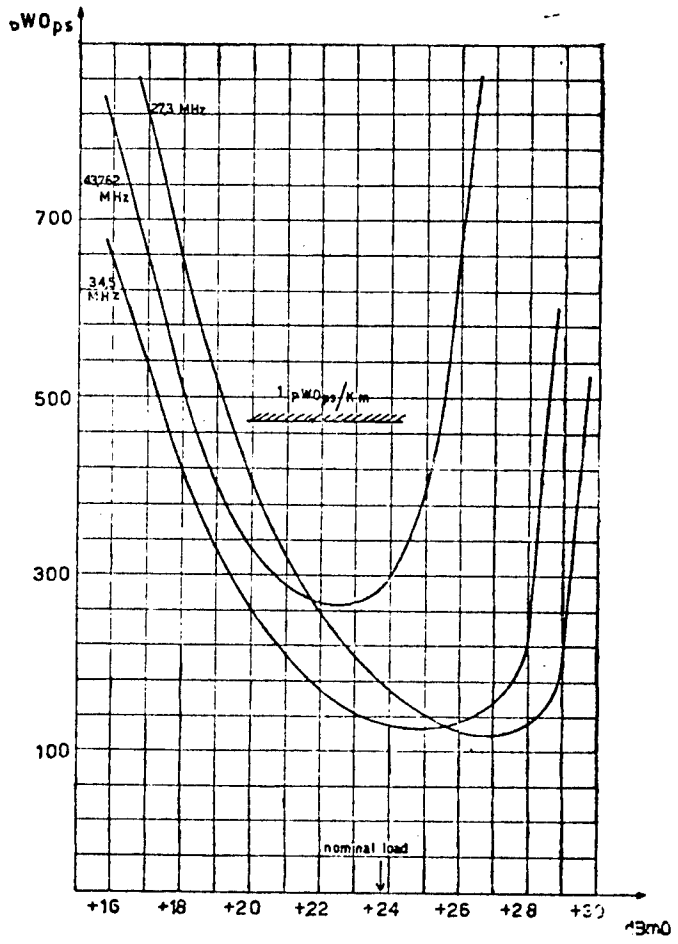

Fig. 13 - *Overall noise as a function of nominal level in the Palermo-Rome direction for 4 kHz channels.*

$$k = +\,22.6 - 10\ log\frac{18936 - 2020}{1.74} = 17.3\ dB\,.$$

Figs. 13 e 14 show the noise level for the three measurement slots in both directions of transmission.

It is seen that the worst value is 0.44 *pWOp/km* for the 43762 kHz slot in the Palermo-Rome direction, compared with the maximum of 2 *pWOp/km* allowed by the specification. The mean value is 0.36 *pWOp/km* compared with the specified value of 1 *pWOp/km*.

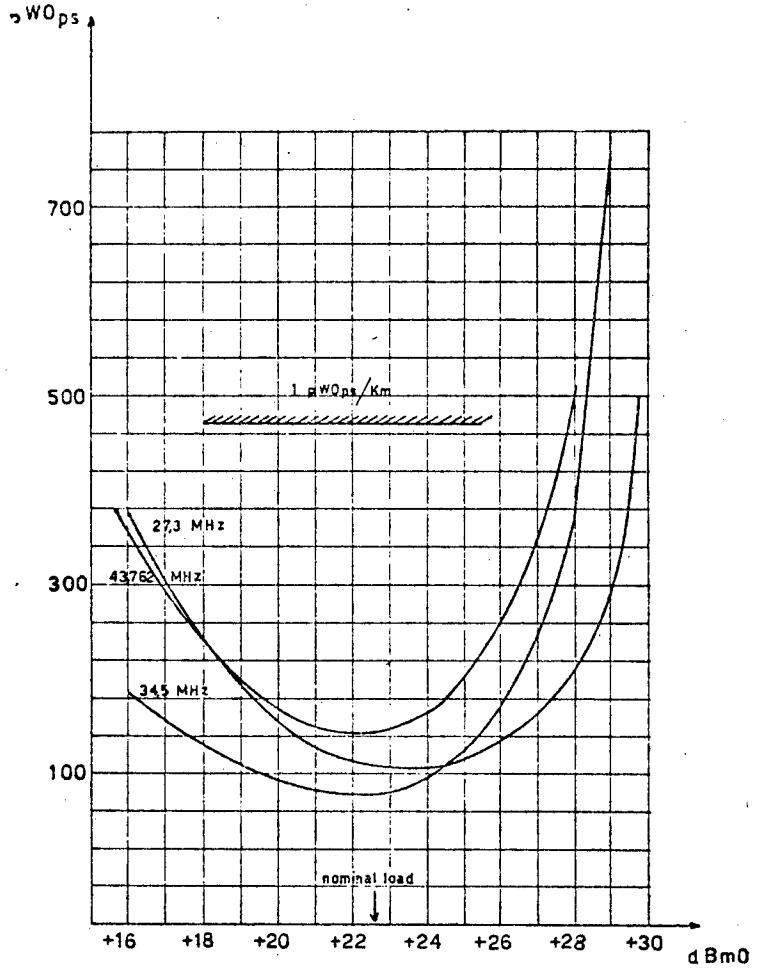

Fig. 14 - *Overall noise as a function of nominal level in the Rome-Palermo direction for 4 kHz channels.*

The margin against overload of the system is 6 *dB*. The performance of the system, therefore, from the point of view of noise, is far better that called for in the technical specification.

If the system were used for telephone channels having a bandwidth of 3 kHz, the capacity would increase from 3600 to 4800 channels. In this case, still assuming a mean load per channel of — 13 *dBm*0, the multichannel load would become

$$-13 + 10 \log 4800 = +23.8 \ dBm0 .$$

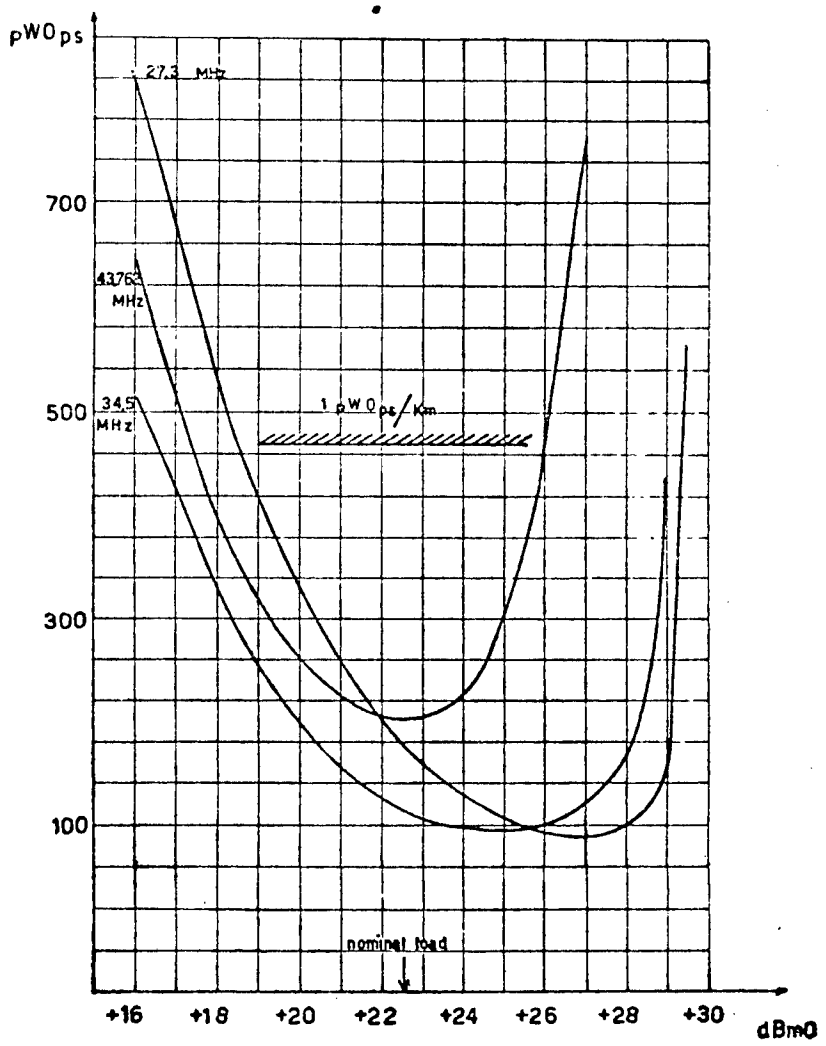

Fig. 15 - *Overall noise as a function of nominal level in the Palermo-Rome direction for 3 kHz channels.*

With a correction factor, for coverting from NPR to the value of overall noise expressed in *dBmOp*, given by

$$k = +23.8 - 10\ log\frac{18936 - 2020}{1.67} = 16.25\ dB$$

bearing in mind that the equivalent bandwidth of the psophometric weighting curve for a channel with a nett bandwidth of 2.85 kHz is 1.67 kHz.

Figs. 15 e 16 show the noise level variations, for a constant channel loading, with variations of the nominal level, for the two directions of transmission. From these it can be seen that the worst value of noise is again in the Palermo to Rome direction, at 0.6 *pWOp/km*, with an average value of 0.41 *pWOp/km*. Again these values are well within the limits specified.

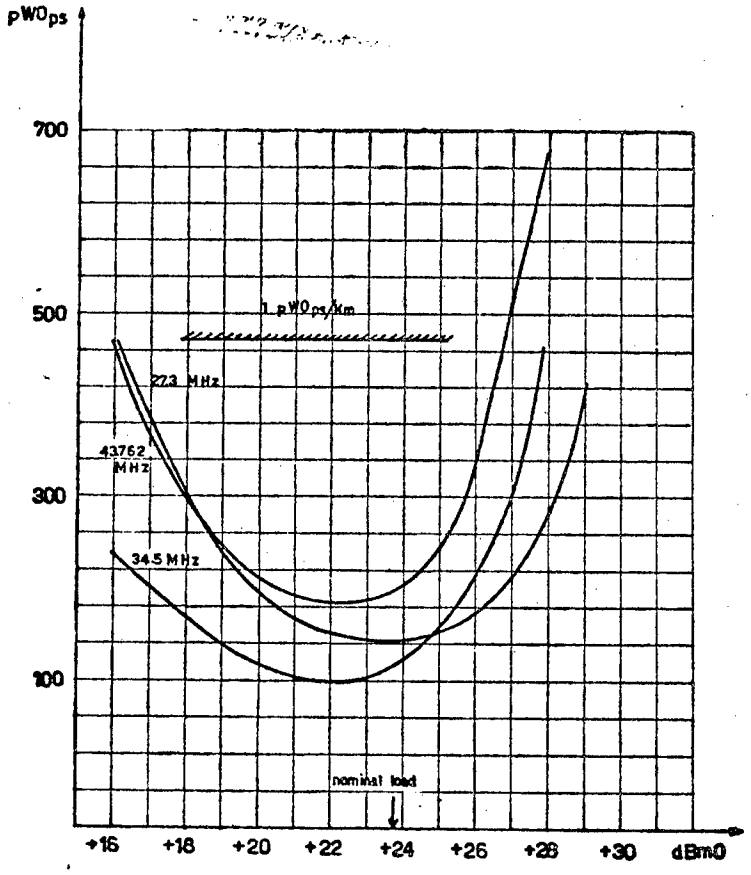

Fig. 16 - *Overall noise as a function of nominal level in the Rome-Palermo direction for 3 kHz channels.*

Nevertheless, to improve the margin against overload if the system is used with 3 kHz channels, it is considered advisable to reduce the nominal transmit level, especially in the Palermo to Rome direction, in which, with the present nominal level there is already a discernible contribution of intermodulation noise in the highest frequency test band (43,762 kHz).

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